
# US LHC Accelerator Research Program

***brookhaven - fermilab - berkeley***

US LHC Accelerator Research Program
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23 May 2003

Dr. John R. O'Fallon
Dr. John W. Lightbody, Jr.
U.S. LHC Joint Oversight Group

Dear Dr. O'Fallon and Dr. Lightbody,

Enclosed is a proposal for the U.S. LHC Accelerator Research Program, as requested by you in your letter to me dated February 5, 2003. The program of accelerator physics and technology research and development that we present is consistent with the guidance contained in your letter, as well as that in the letter from you to Mike Witherell, dated November 21, 2000, which established the U.S. LHC Accelerator Research Program. This proposal has been developed by the collaboration of Fermilab, Brookhaven and LBNL, working in close consultation with our colleagues at CERN. It was formally reviewed by a joint U.S.-CERN Committee on April 10, 2003, and CERN's support is documented in a letter from Lyn Evans, which is included as an appendix to the proposal.

The program that we put forward involves participation in commissioning the LHC to bring it on and up to full performance quickly, fundamental accelerator physics research, the development of advanced beam instrumentation to gain deeper understanding and more robust control of the LHC beams, and accelerator physics and superconducting magnet R&D aimed at a timely upgrade to significantly increase the LHC luminosity. This program will be an important component of the overall United States High Energy Physics program, and supports the finding in the recent HEPAP report on future HEP Facilities that an LHC luminosity upgrade is "absolutely central" to the long-term goals of our field. It will help maximize our investment in the LHC and its large experiments by enhancing the performance of LHC, and it will leverage that investment to maintain the United States National Laboratories at the forefront of the science and technology of high-energy hadron colliders.

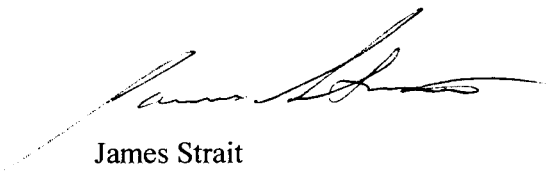
To fit the program within the funding guidance, we have been required to make certain compromises that delay some work and increase technical risk. The initial instrumentation R&D and the technology development for the $Nb_3Sn$ magnet needed for the LHC upgrades start considerably more slowly than is optimal. The level of effort on beam commissioning and fundamental accelerator physics that is permitted by the budget will limit the impact we can have on LHC performance and limit the benefit to the U.S. accelerator physics program. The magnet R&D required for the luminosity upgrade is very challenging. While it is clearly very desirable for us to have programs to develop both quadrupoles and dipoles,

it may prove necessary to concentrate most or even all of the resources of the three Laboratories on one of the magnet types, most likely the quadrupole, to ensure that we will be successful in developing it to be ready for use in the LHC upgrade.

We believe that with modest additional annual funding, we could execute a substantially more powerful program. We will shortly present to you a separate report which outlines an enhanced U.S. LHC Accelerator Research Program, a program that would more fully exploit the LHC for accelerator research by American scientists, and lead more quickly and surely to the highest possible performance of the LHC as a tool for High Energy Physics research.

I look forward to working with you to make the U.S. LHC Accelerator Research Program a reality.

Sincerely,



James Strait
Program Leader
U.S. LHC Accelerator Research Program

Attachment

cc (without Attachment*):
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T. Taylor, CERN
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*The Proposal can be found at http://www-td.fnal.gov/LHC/USLARP/LARP_Proposal.pdf